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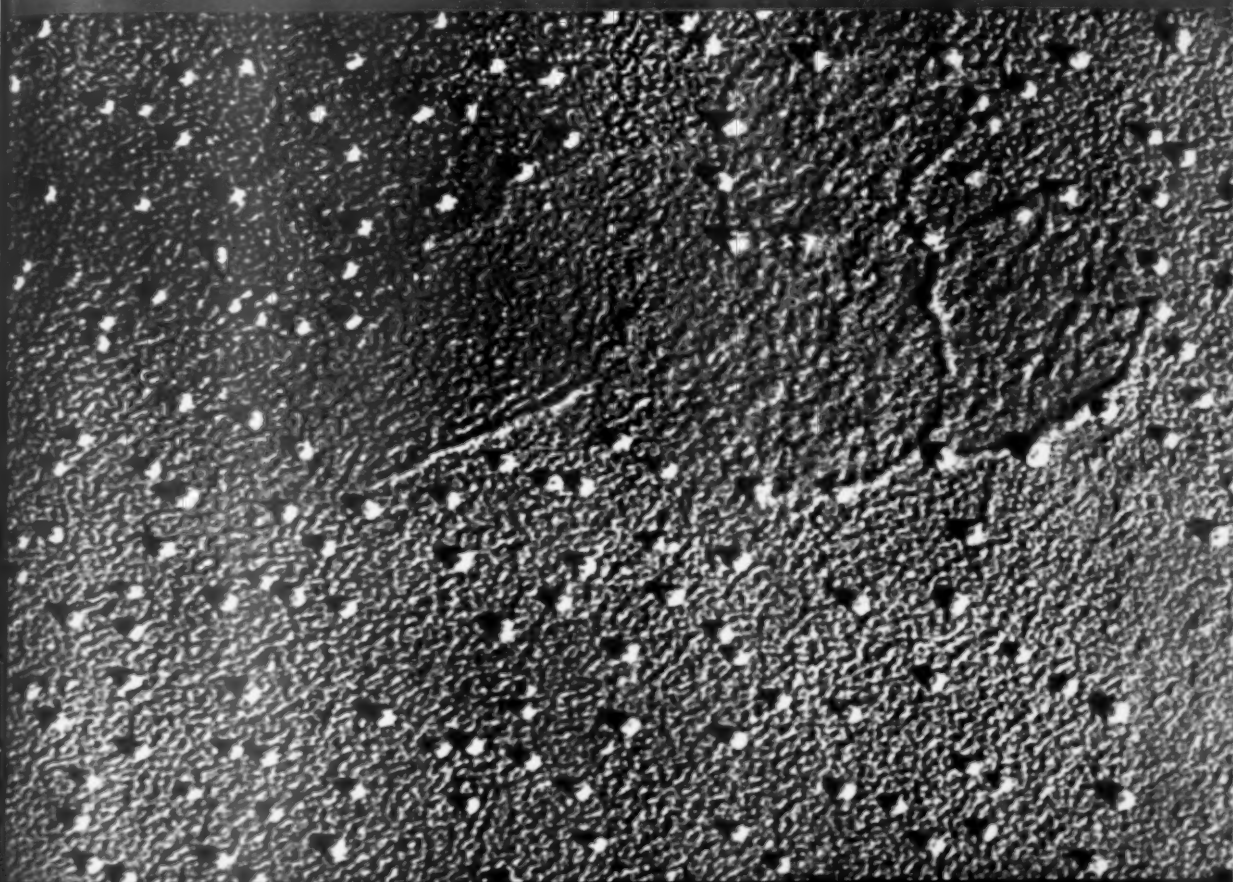
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PAGES 201-218

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



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METEOROLOGY

Warning Saves Lives

► UP-TO-DATE changes in the United States hurricane warning network are credited with saving many lives in Hurricane Carla's savage attack on the Texas coast.

The modern day exodus inland of an estimated 300,000 coastal residents, which prompted some observers to call it the greatest flight of humanity in U.S. history, was brought about by the warnings received from a new radar network and a newly installed automatic sea-going weather station. Both became full-fledged members of the warning network just last month.

Radar units at Galveston and Lake Charles, Texas, pinpointed the onrushing hurricane when it was more than 260 miles off the coast. The radar's searching beam kept close tabs on the hurricane, tracking it all the way in to the coast.

Nomad I, an automatic weather station bobbing out in the Gulf of Mexico, also provided an advance warning of the hurricane. The robot "buoy" kept broadcasting data even when the storm churned huge waves as it swept by.

Hurricane Debbie following on the heels of Carla was spotted veering northeastward away from the continent by Tiros III weather satellite. The hurricane has missed the continent altogether.

The newly-completed radar network scans the U.S. coastline from Texas to Maine. The radar stations can track storms about 200 miles off the coast.

The old tried and true method of hunter airplanes is still best for tracking storms far out at sea, the Weather Bureau reported. These planes sometimes fly into swirling storm centers to collect weather data.

Hurricanes Betsy, Carla and Debbie were the product of the same weather conditions that hung around the Gulf Coast-Caribbean Sea area for a sustained period of time. A shifting high pressure area, strong trade winds and warm ocean air masses triggered off the three hurricanes in quick succession. Turbulent weather associated with Hurricane Carla spawned many destructive tornadoes.

September is the peak month for hurricanes. After receiving the warm sun rays all summer, the ocean reaches its highest temperature during this month. The warming of the air masses above the water provides energy to feed the hurricanes.

• Science News Letter, 80:202 September 23, 1961

Like 10,000,000 A-Bombs

► A TYPICAL hurricane unleashes energy equal to 10,000,000 atomic bombs during its lifetime.

Slashing rains with winds that may reach over 150 miles an hour are created by energy generated within a whirling hurricane. Every second a hurricane releases at least ten times as much energy as the original Hiroshima-type bomb.

Trying to control such huge outbreaks of nature's energies is still beyond scientists'

present capabilities. U.S. Weather Bureau scientists are now searching for a weak spot in the hurricane's system when it is first forming to try to control it.

One such experiment will be carried out this month when airplanes will fly straight into a storm and drop silver iodide crystals in an effort to affect the storm.

• Science News Letter, 80:202 September 23, 1961

Carla's Winds "Extreme"

► HURRICANE CARLA, with wind velocities hitting 173 miles an hour, ranks as one of the eight worst storms reported on the Texas coast since 1875, the U.S. Weather Bureau reported.

Before Carla, only seven of the tropical storms recorded in the area, starting in 1875 and continuing through 1949, were classed as "extreme," meaning that wind velocities exceeded 136 miles an hour and central barometric pressure was less than 28

BIOLOGY

Outer Cell Coating Seen

► PICTURES TAKEN with the electron microscope give evidence that every living cell has an outer coating of complex sugar compounds.

One evidence of this coating was previously recognized in certain organs and tissues as a "basement membrane," but the light microscope did not show such a layer surrounding all living cells.

Dr. H. Stanley Bennett, dean of the division of biological sciences, University of Chicago, reported the evidence for all living cells at the First National Congress of Anatomy in Mexico City. He named the outer layer of complex sugar compounds, or polymers, "glycocalyx," which translated from the Greek literally means "sweet husk."

Each living cell is surrounded by two coats, Dr. Bennett said. The inner of these coats is the plasma membrane. The glycocalyx, which is on the outside, can be seen surrounding cells from an amphibian, a mold, a bacterium and a number of cells of mammalian tissues.

The outer coating is rich in polysaccharides—complex sugar compounds formed by combinations of many smaller sugar molecules. The chemical nature of each polysaccharide determines its properties, which play an important part in the cell activities.

In bread mold the electron microscope reveals both the inner plasma membrane and the outer glycocalyx.

In mammalian egg cells, the glycocalyx is so conspicuous that it can readily be identified with a light microscope.

A very thinly spread layer of polysaccharides around red blood cells has been seen

inches. Records of Texas coastline tropical storms, dating back to 1766 and sketchy in the earlier years, show a total of 95, of which 62 have hit hurricane velocities of 74 miles an hour or more.

Wind velocities in hurricanes have been measured for sustained periods of five minutes at more than 150 miles an hour, while shorter gusts "in the most violent storms" have been clocked as high as 250 mph. Land-based anemometers for measuring wind velocity are usually damaged or blown away when winds attain extreme hurricane force, but accurate measurements are possible from instruments on nearby ships or airplanes.

The strongest winds on record, however, were not measured during a hurricane, but during an "extra-tropical storm," or winter blizzard, on Mt. Washington in New Hampshire, in the early 1930's. Winds blew at 188 miles an hour for sustained periods and in brief gusts at 229 miles an hour. An "upslope" effect in a mountainous area can cause such extremes during winter storms, the Bureau said.

• Science News Letter, 80:202 September 23, 1961

with the electron microscope, the scientist said. The chemical nature of this layer determines the blood types A, B, AB and O.

In heart muscle cells, the electron microscope shows the glycocalyx running parallel to the extensive plasma membrane, Dr. Bennett pointed out. Here, too, evidence has been found that this layer is composed of sugar polymers. Dr. Bennett said still other examples of the glycocalyx are known and he expects the discovery of more.

"We are beginning to comprehend its physiological importance," he said. "In some cases, this coating has an important role in selective uptake of substance by cells."

• Science News Letter, 80:202 September 23, 1961

GENERAL SCIENCE

Large Nations Have More Chance of Science Talent

► BECAUSE SCIENTIFIC and other high abilities seem to be possessed by people equally often in all nations, large nations will have advantages in science talent over small ones, provided the social systems do not frustrate ability, Prof. C. F. Carter, political economist of the University of Manchester, told the British Association for the Advancement of Science in Norwich, England.

Although large organizations may by their complexity make leadership and creative work difficult at times, nevertheless Prof. Carter observed that a scientist's ability to make new discoveries may be increased and certainly not reduced if his product has a large market instead of a small one.

• Science News Letter, 80:202 September 23, 1961

IMMUNOLOGY

100% Measles Protection

A measles vaccine has been successfully used in an epidemic. Gamma globulin is injected after the live measles virus for results without side effects, Faye Marley reports.

► A MEASLES VACCINE has been successful against an epidemic in the Philadelphia area.

The trick is to inject gamma globulin in the opposite arm immediately after the live weakened measles-virus vaccine is injected, a group of physicians reported.

The vaccine was originally developed by Dr. John F. Enders and his colleagues at Harvard University, but tests with the vaccine alone have resulted in fever and rashes.

Dr. Joseph Stokes Jr. of the University of Pennsylvania, Physician-in-chief at Children's Hospital, Philadelphia, told *SCIENCE SERVICE* that he and his co-workers had begun tests with human immune globulin combined with the vaccine several years ago.

Also combining live measles-virus vaccine with gamma globulin has been Dr. Fred R. McCrumb Jr., who last June reported that with his colleagues in Baltimore and St. Joseph, Mo., he had immunized some 1,500 children. Dr. McCrumb is on the staff of the University of Maryland Medical School, Baltimore.

The difference in the Philadelphia report is two-fold, Dr. Stokes said. The 605 children involved, including controls injected with killed measles-virus vaccine, were exposed to measles later. Also, the vaccine used was grown in chick embryo rather than in dog kidney.

Dr. Stokes believes that the mammalian dog kidney is too much like the organs of man to be successful.

Dr. Samuel Musser of Philips Roxane Inc., St. Joseph, developed the vaccine in dog kidney.

All the experimental measles vaccines have been based on original work done by

Dr. Enders, but a number of live and killed virus vaccines have been produced since the 1954 Nobel Prize winner first produced his vaccine. (Dr. Enders received the Nobel Prize for polio virus culture.)

The Philadelphia study included 562 children living in a residential environment in Haverford Township, Pa., and 43 children in St. Vincent's Home, an orphanage in the city.

Not a single child who received the live virus vaccine got measles during subsequent epidemics, but a large number who had been injected with killed virus vaccine came down with the disease.

Dr. Maurice R. Hilleman of the Merck Sharp & Dohme Research Laboratories, West Point, Pa., who was one of Dr. Stokes' collaborators on research, said that the relative amounts of gamma globulin and virus in the vaccine are being investigated.

Government standards to control vaccine manufacture also must be issued before any such vaccine can be released for general use.

An international conference on measles immunization is scheduled for Nov. 7 to 9, 1961, at the National Institutes of Health, preliminary to a decision on standards for control.

Details of the Philadelphia report appear in the *New England Journal of Medicine*, 265:507, 1961. Collaborating on the research were Drs. Robert E. Weibel and J. Ronald Halenda of the Children's Hospital and University of Pennsylvania, and Drs. Eugene B. Buynak and Herman Goldner of the Merck Sharp & Dohme Laboratories.

• *Science News Letter*, 80:203 September 23, 1961

Cloud pictures from Tiros I indicated that "mother" clouds, where tornadoes originate, could possibly be picked out from other clouds. Tiros III will be used for tracking hurricanes this fall.

• *Science News Letter*, 80:203 September 23, 1961

SPACE

Landing Satellites On Space Stations

► A SATELLITE whirling through outer space can land at a space station with the help of magnets.

Creating electromagnetic fields around the hulls could eliminate some of the complex systems now proposed, Dr. Elliott T. Benedikt, Space Physics Laboratory at Northrop's Norair Division at Hawthorne, Calif., told an American Astronautical Society meeting in San Francisco.

With a power source in the satellite and electric coils around the hulls, the vehicles can be attracted for landing or repelled for taking off by changing the polarity of the electromagnetic fields.

• *Science News Letter*, 80:203 September 23, 1961



SPACE

Donations for Space

► AMERICANS are interested in sending man into space.

Dr. James E. Webb, National Aeronautics and Space Administration Administrator, said that many letters containing checks to help pay for Cmdr. Alan B. Shepard Jr.'s space flight have been sent to NASA.

He said that many checks in the amount of \$2.25 were received because that figure had been calculated as the cost of the astronaut's trip to each United States citizen.

When the money is sent by "sincere" persons, NASA keeps it. A letter of thanks is sent to each donor over Dr. Webb's signature, saying the money will be used in the space program. However, if the money is designated to go to a special project, it is returned.

Dr. Webb said NASA will eventually

attempt to send up space vehicles housing 10 to 12 men for space exploration. He said a new kind of thinking is needed to approach the new problems of much larger facilities for building and shooting up much larger spaceships.

The organization now being set up to handle the moon program will be designed to function for at least a ten-year period, Dr. Webb told the National Press Club in Washington, D. C.

He mentioned progress in space communications, weather research and other fields of science. He said that the weather satellite program will attempt to have a Tiros satellite in the air at all times until a permanent weather satellite system (Nimbus) can be launched to send continuous weather information back to earth.

NUCLEAR POWER PLANT—A 300 kilowatt space power plant, SPUR, designed by the Garrett Corporation, Phoenix, Ariz., will generate electricity from 2,500 pounds of cesium, giving the unit a life of about one to three years. The turbine generator is about three feet long.

MEDICINE

TB High in Men Over 50

► **MEN IN RUSSIA** as well as in some other countries are more frequently affected by tuberculosis than are women. The majority are more than 50 years old.

In one group of 759 tuberculosis patients over 50, 453 were men, Prof. Ph. V. Shebanov, president of the Society of Soviet Phthisiatry, Moscow, told the International Tuberculosis Conference in Toronto, Canada.

However, various non-tuberculosis diseases also occur among elderly patients more often than among those under 50, Prof. Shebanov said. This causes confusion and delay in the diagnosis, as elderly people tend to think that TB is one of their other ailments.

Prof. Paul Freour of Bordeaux, France, said tuberculosis of aged persons is becoming more frequent in France.

When an old person has a cough, he considers it trivial and neglects to have medical attention, Prof. Freour said. It often happens that a pre-existing disease masks tuberculosis and delays the diagnosis.

Tuberculosis among the aging is often carried over from early life, Prof. E. A. Uehlinger of the Pathology Institute of the University of Zurich said.

Old people have senile atrophy of the lungs, Prof. Uehlinger said, which decreases

the ability of the lungs to expand. Also at fault are lung adhesions, chronic bronchitis and fibrosis. In certain cases, cortisone can increase the respiratory efficiency of the lungs.

• Science News Letter, 80:204 September 23, 1961

Resistance to TB Drugs

► **RESISTANCE** of infections to anti-tuberculosis drugs is slowing up the global control of tuberculosis, which takes nearly 3,000,000 lives a year the world around.

Paris and New York have the highest percentages of infections showing resistance to the drugs usually efficient in treating TB. Hungary, Germany and the Netherlands have the lowest frequency of such infections.

Scientists from the Soviet Union, Brazil, Great Britain, Germany, Hungary and the United States opened the first panel discussion on drug resistance of the tubercle bacillus in Toronto, Canada.

Prof. Miklos Lanyi, chief of the laboratory of the lung clinic, Budapest, Hungary, said several drugs in combination would show better results than one alone.

His statement was backed up by Dr. D. A. Mitchison of the Postgraduate Medical School, London, who said the higher prevalence of primary resistance to isoniazid

in India was due to the use of this drug alone. Isoniazid, para-aminosalicylic acid (PAS) and streptomycin are the three most widely used drugs in TB treatment.

Complacency in certain countries because of the comparative success of the anti-tuberculosis drugs is another obstacle in the way of eradication of the disease.

In another panel, on how to inform the public that TB is not yet under control, Dr. T. J. Joseph, medical superintendent of the Lady Linlithgow Sanatorium, Kasauli, India, said conditions in the underdeveloped countries must be especially considered.

Methods of tuberculin-testing, X-rays and bacteriological examinations should be presented simply in various countries, with audio-visual teaching aids used for the great numbers of illiterate people in need of help, Dr. Joseph said.

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GENERAL SCIENCE

News From Science Clubs

► **IDEAS** that keep club members interested and active are plentiful in the latest group of activity reports sent to Science Clubs of America.

THE SIERRA High School Science Club in Whittier, Calif., has published a 75-page Science Journal detailing experiments and scientific investigations done by students. The journal will be published annually. Copies of the first issue are available to science teachers and others interested on request. The school's address is 9401 South Painter Avenue, Whittier.

ALSO NEW to the publishing business is the Science Club at Central High School, South Bend, Ind. The club's biweekly paper is called Contrails. The members have been making field trips to out-of-town industries via chartered bus.

THE SCIENCE CLUB at Springfield High School, Springfield, Pa., conducted an electronic workshop for its members in June, featuring lectures and demonstrations on voltmeters, electric soldering, telescopes, oscilloscopes and transformers.

IN SOUTH INDIA, the Science Club at B.E.M. High School, Badagara, Kerala State, has been working on scientific models made of clay and paper pulp.

THE SEMPER SCIENTIA Club at Davenport High School, Davenport, Wash., has made a science lecture program available to grade school classes. Members prepare and

present demonstrations on specific science units that are being taught at the elementary level.

THE SENIOR Science Club at Van Buren High School, Eufaula, Ala., has repaired radio sets, helped with community garden shows, and sponsored an "atomic greenhouse."

THE HONORARY Chemistry Club at the East Peoria, Ill., Community High School schedules a talk by a visiting scientist at each of its monthly meetings.

THE SCIENCE Club at the Philadelphia, Pa., High School of Agriculture and Horticulture has conducted soil tests for the school and the community, and is maintaining collections of small animals and tropical fish.

IN PATERSON, N. J., the Albertus Magnus Science Club at St. Mary High School sends its members to elementary schools to serve as student teachers, and has been active in the Junior Civil Defense program.

THE BIOLOGY Workshop Club at Mt. Pleasant, Tex., High School takes care of the rose garden on the school campus.

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• Science News Letter, 80:204 September 23, 1961

AERONAUTICS

Mach 3 Transport Urged

► THE UNITED STATES should have supersonic transports, flying at three times the speed of sound and capable of a New York-to-London run in slightly more than two hours, in full commercial operation by the early 1970's, the President's Task Force on National Aviation Goals believes.

Cooperation between the Federal Government and U. S. aircraft manufacturers in developing a Mach 3 transport is one of the key recommendations in the Project Horizon report submitted to the President after a six-month study. The report outlines national aviation goals over the next decade.

Being first with a Mach 3 passenger plane would not only enhance American prestige, but enable airlines to operate more economically and cut their fares on long-distance hauls, the group said.

Since present subsonic transports cannot stand the heat of supersonic flight, the venture would require complete new concepts in design and materials.

The Task Force recommends skipping the Mach 2 (twice the speed of sound) stage and shooting for Mach 3 instead, on the grounds that anything developed at the lower speed would be obsolete too soon to justify the expense. The British and the French already have indicated an interest in developing their own Mach 2 transports.

Cost of developing a 2,000-mile-per-hour Mach 3 model is estimated at between \$500,000,000 and \$800,000,000. Once in production, the per-plane cost would be about \$20,000,000.

The cost is too much for private industry to bear alone, so Government help is necessary, the report emphasizes. Congress already has approved an \$11,000,000 expenditure for the first of a series of studies aimed at the development of a supersonic

transport. Next year's needs, a Federal Aviation Agency official said, will be more than double this if the program continues at its proper pace.

The revolutionary new transport is only one of 24 major goals set by the Task Force, which operated with FAA support and was headed by Fred M. Glass, New York, executive vice president of the Hertz Corporation.

Top emphasis is also laid on maintaining "world leadership in all phases of aviation" and in promoting safety. To implement safety, the Government is urged to set up within five years a unified air traffic management system assuring "safe and efficient use of airspace by both civil and military aircraft." The report calls for establishment of a Federal Aviation Service, operated by FAA on a civil level but available to the military in emergencies, to man the new system.

The Civil Aeronautics Board is criticized, in effect, for having allowed too many competing airlines to operate in areas where the extra service was unnecessary. They are urged to encourage more mergers.

The group said the U.S. needs "more efficient helicopters and other vertical or short take-off and landing aircraft" for short-haul traffic, but that industry should finance most of this work without Government aid.

President Kennedy, in a letter to FAA Administrator N. E. Halaby, said the report includes many controversial matters and recommendations requiring future resolution, but called it "an excellent analysis."

He asked Mr. Halaby to "take the lead in developing recommendations for specific actions."

• Science News Letter, 80:205 September 23, 1961

SOCIOLOGY

How to Prevent Strikes

► STRIKES can be prevented by action based on science. Psychologists and sociologists have the necessary know-how to cure industrial friction such as that behind the automobile strike that has involved the biggest walkout in automotive history.

Strikes, it is recognized, are symptoms of social disease, just as fever is a symptom of many physical diseases.

Modern physicians do more than give fever patients cooling baths to reduce fever. They go after the germs or other causes of the fever to get the patient well.

Social psychologists have better ways of treating social sickness than prescriptions for cooling-off periods to avert strikes. They, like doctors of medicine, can diagnose the causes and apply remedies that will get the patient—in this case, the nation itself—back on the road to health.

A commission of scientists to be sponsored by the Government has been urged as a means for diagnosing the social ills

that underlie recurrent strikes in the automobile, steel, coal and other industries. Such a commission would devote itself to a scientific search for facts, causes and effects and so would be in no sense partisan.

Unfortunately, the "grievances" discussed over the conference table are not always the basic conditions that make the workers unhappy. It is difficult for a worker, or his representative at the conference table, to express just what he finds undesirable in a job. The easiest thing to say is that the pay is not high enough. But really, the worker might still be unhappy if the pay were greatly increased. Perhaps he is troubled because there is no suitable place for his family to live or for some other reason not even mentioned in the talks.

Scientists, with modern interviewing and polling techniques, might be able better to get at the root of the friction.

Research techniques and scientific knowledge have developed in recent years to such

an extent that a scientific commission could bring about a significant reduction of tension in industry. This opinion was expressed in a steel strike situation by Dr. Dorwin Cartwright, director of the Research Center for Group Dynamics, University of Michigan, who is a student of industrial relations.

A prescription for emergency treatment, suitable for strikes, has been worked out by Dr. Francis Bradshaw, New York psychological consultant.

It is difficult, he points out, for the top men in a dispute to come to an agreement. Each feels that he cannot "back down" on any single point without betraying his constituents. And yet it is doubtful whether any top man in an industrial dispute knows just what the men he represents might be willing to agree to.

The remedy, as seen by Dr. Bradshaw, is to bring together two groups, each one made up of representatives of each level in the hierarchies of management or of labor, from big boss to assistant foreman, from union president to shop steward.

Setting the scene for these discussions is important.

There should be no reminders of the respective status of the participants. The atmosphere of a courtroom and "witnesses" should be avoided.

Discussions should be implemented, when disagreements occur over facts, by sending out and ascertaining just what the situation is by use of scientific methods.

• Science News Letter, 80:205 September 23, 1961



THREE DIODES IN ONE

TECHNOLOGY

Diodes in Multiple Sets For Computer Networks

► ASSEMBLIES of two or three silicon switching diodes, housed in a tiny package the size of a match head and thinner than a nickel, have been developed by Radio Corporation of America, Somerville, N. J. The reduction in size and the replacement of individual diodes are expected to simplify construction of logic networks in computers. Smaller computers, capable of a larger work load than current types can handle, may result.

• Science News Letter, 80:205 September 23, 1961

PHARMACOLOGY—CHEMISTRY

Drug May Save Hearts

► **ANTI-DIABETES** drugs taken by mouth are under investigation for protecting diabetics against heart trouble, it was reported at the American Chemical Society meeting in Chicago.

Oral anti-diabetes drugs decreased cholesterol synthesis in rat liver, Dr. Hugh J. McDonald of Loyola University, Chicago, said. High levels of cholesterol in the blood are believed by some to be responsible for the development of atherosclerosis, he explained.

It cannot be definitely established that the oral anti-diabetes drugs lower the levels of blood cholesterol in diabetics and protect them from atherosclerosis without extensive clinical studies, Dr. McDonald cautioned. The findings with the rat liver tissue are only preliminary, he said.

The anti-diabetes drugs cannot be used against atherosclerosis in non-diabetics, in spite of the extreme importance of this medical problem, because the drugs cause a drastic lowering of blood sugar levels. It is quite possible, however, he added, that the findings will point the way to the development of drugs that would be effective against atherosclerosis without affecting blood sugar levels. Such drugs might be used in non-diabetic patients.

The effects on cholesterol synthesis of oral agents now available to the public have not previously been reported. In fact it had even been suspected that the drugs might be helping the patient's diabetic condition, but at the same time exposing him to the bad effects of increased blood cholesterol levels, Dr. McDonald said.

Market names of the drugs being tested are orinase, debinase and DBI.

• Science News Letter, 80:206 September 23, 1961

Plant Tissue Culture

► **THE FIRST** tissue culture ever to be obtained from plant pollen provides valuable information on tissue formation and growth, it was announced at the American Chemical Society meeting in Chicago.

The pollen is from the Maidenhair tree, or *Ginkgo biloba*.

Requirements for plant growth can be more easily studied in this isolated homogeneous culture, Dr. Walter R. Tulecke, Boyce Thompson Institute, Yonkers, N. Y., said and will lead to a better understanding of how plant cells use their food supply.

It has been discovered, for instance, that the tissue uses the important amino acid, arginine, essential to all living cells, in a different way than animal cells. It was also found that sugar is rapidly utilized by the tissue, that citric acid predominates among the acids present, and that the tissue stores nutrient solution in which it is growing by secreting amino acids into it.

Knowing the medium and tissue composition during rapid tissue growth will also permit "a more rational approach to controlled growth," Dr. Tulecke said.

At the present time no metabolic products of the tissue are of commercial value, but similar methods applied to other tissues from higher plants might lead to the synthesis of compounds of some value, Dr. Tulecke concluded.

• Science News Letter, 80:206 September 23, 1961

Organisms Eat Waste

► **DRUG-EATING** organisms are solving a serious disposal problem, scientists were told at the American Chemical Society meeting in Chicago.

The disposal of the liquid process wastes from the manufacture of antibiotics such as penicillin has created a major problem since World War II, Dr. Ross E. McKinney of the University of Kansas said. The wastes are 20 to 40 times as concentrated as domestic sewage.

A new method has now been developed using microorganisms that can eliminate the wastes in a single stage process, Dr. McKinney reported. This is the first biological waste treatment process to be designed from the microbiological viewpoint, he said.

Previous methods using microorganisms, called activated sludge methods, did not have oxygen transfer equipment that could meet the oxygen demand in the aeration tank. The new process distributes the organic wastes over the entire aeration tank so that there is no high oxygen demand rate as in conventional activated sludge.

"Mathematical equations have been developed which permit accurate design of the complete mixing activated sludge systems. These equations permit the engineer to know what results to expect before the plant is put into operation and to evaluate operation problems which may arise," Dr. McKinney concluded.

• Science News Letter, 80:206 September 23, 1961

New Anesthetic

► **AN ANESTHETIC** which does not cause unstable heart rhythm or sharp drop in blood pressure was announced at the American Chemical Society meeting in Chicago.

The anesthetic, methoxyflurane, reduces the need for post-operative narcotics and minimizes possibilities of over-dosage, Dr. Eric R. Larsen, Dow Chemical Company, said. It is compatible with nearly all drugs commonly used in surgery and can be applied with conventional anesthesia apparatus without modifications or special attachments.

First prepared in Great Britain in 1940, methoxyflurane remained a laboratory curiosity because of the impurities which made it unstable. A method recently developed to remove the impurities provides a compound with a shelf life of several years, Dr. Larsen reported.

The physiological action of methoxyflurane is similar to diethyl ether, a commonly

used anesthetic, but unlike ether it does not form explosive peroxides on long exposure to oxygen, hence the unusual stability, Dr. Larsen explained. It is also considerably more stable to light than chloroform and halothane.

• Science News Letter, 80:206 September 23, 1961

Meat Flavor to Order

► **SAWDUST** can taste like steak when chemists put the flavor in it, the American Chemical Society meeting was told in Chicago.

The flavor in meat is caused by simple chemical compounds that can be reproduced and placed in foods before cooking to produce a mouth-watering meat flavor at will, Dr. Wendell A. Landmann of the American Meat Institute Foundation, Chicago, reported.

Meat has been separated into water-soluble materials, fat and water-insoluble materials, Dr. Landmann explained. After heating these fractions, the scientist found the meat flavor and aroma only in the water-soluble material.

Further separation of this material showed that the fundamental meat flavor could be produced from two compounds, inosinic acid and a protein that contained sugar. These compounds in themselves have no odor, but when these are mixed and heated with fat or water, the odor and taste of broiled or boiled meat is obtained, he said.

"The housewife will be able to tailor meat flavor to suit individual tastes of her family and she can be sure of uniform flavor quality when she purchases a steak," Dr. Landmann said. Applications to space-feeding and to the synthetic foods for future populations are also being explored, he concluded.

• Science News Letter, 80:206 September 23, 1961

BIOLOGY

Algae Could Provide Oxygen for Spaceman

► **MINUTE PLANT LIFE** that form the common green scum found on the surface of stagnant ponds and in river beds, *Chlorella* algae, assisted by the sun, may provide the future man in space with the oxygen essential to maintain life.

A new gas exchange device operating on the principle of photosynthesis was designed and demonstrated by Lt. Col. John B. Fulton of the U.S. Air Force Arctic Aeromedical Laboratory, Fairbanks, Alaska.

The algae using the energy of the sun convert the carbon dioxide exhaled by the astronaut into oxygen which is breathed in and exhaled again as carbon dioxide, the process being repeated indefinitely.

One of the major problems still to be solved for survival in space is the continuous supply of oxygen and this photosynthetic gas exchanger, which differs from other models in employing direct sunlight, is an important advance and will most probably be used in future space flights.

• Science News Letter, 80:206 September 23, 1961

ARCHAEOLOGY

Seek Man's Missing Links

► SOUTHERN ARABIA will be "combed" this winter for clues to missing links in the human history.

A team of U. S. scientists, led by Dr. Gus Van Beek, associate curator of old world archaeology at the Smithsonian Institution, will survey the fertile valley of Hadhramawt for town sites, cemeteries, quarries and irrigation remains of past ages.

Dr. Van Beek told SCIENCE SERVICE no evidence of man is known from the area between the old stone age, or about 50,000 years ago, and 500 B.C.

He said it is quite unlikely that the area had remained uninhabited all that time. His team will mark sites believed worthy of excavation and will also collect such artifacts as potsherds for dating the sites. If a site shows several periods of occupation, the expedition will make on the spot test excavations for further studies.

Dr. Van Beek said the survey, lasting from October, 1961, through March, 1962, will be of great value for later archaeological expeditions wanting to explore the valley further. If promising sites are found, the Smithsonian may send other expeditions to dig up their secrets.

South Arabia may have served as one of the corridors for the movement of humans, plants and animals between the Asian and African continents. One of the aims of the expedition will be to find clues to the extent of this role.

To this end, Dr. Henry W. Setzer, associate curator, of the Smithsonian division of mammals, will collect skin and bone specimens of animals now living in the Hadhramawt Valley.

These specimens will then be compared

to any animal remains of earlier times found there so changes in the structure and appearance of the animals can be studied. This collection will also be compared to similar animals now living in other parts of the world to see if a bull living in southern Arabia today is different from those living elsewhere.

An interesting puzzle for the expedition to solve will be the difference between the humped cattle now living in southern Arabia and that appearing on old sculpture found in the area.

The cattle portrayed on ancient sculpture have no hump on their back. It is not known when the humped cattle were imported to the area and it is not certain that even dated objects can be used as an exact guide.

Sometimes artists will continue to show animals of an earlier period, although these animals do not live in the country any more. The flat-necked bull could have become part of a stylistic convention kept long after the humped cattle had become common.

Southern Arabia, where salt mining is now the main industry, was once the greatest producer of two high priority items in the ancient world: frankincense and myrrh.

These gum resins were in great demand for use in medicine, and frankincense was used for making incense for the religious rites of nearly all the ancient civilizations, including those of Mesopotamia, Greece and Rome. Myrrh was chiefly desired for making cosmetics.

Unfortunately, archaeologists know less about the area from man-made objects found there than from Roman writers, Dr.

Van Beek said. Five ancient states are known to have existed around the southern tip of Arabia, of which Saba, or Sheba, is the most well-known from the biblical reference to the Queen of Sheba who visited Solomon with a huge caravan carrying spices (frankincense and myrrh), gold and precious stones.

This, if historically true, would mean that the area produced the sought after gum resins as early as the tenth century B.C., a theory supported by the find in Palestine in 1957 of a clay seal with a south Arabian inscription.

Two other experts will help the expedition prove that man was there in the new stone age and show what his life was like: Dr. Glen H. Cole, department of anthropology, University of Chicago, and Dr. Albert Jammé, W.F. (White Father, Society of Missionaries of Africa), research professor and script expert at Catholic University, Washington, D. C.

• Science News Letter, 80:207 September 23, 1961

INVENTION

The Three Millionth U.S. Patent Granted

► THE 3,000,000th patent issued by the U.S. Patent Office has been awarded.

Dr. Kenneth R. Eldredge, staff scientist at Stanford Research Institute, Menlo Park, Calif., won the patent for inventing a speedy electronic system for reading bank checks. United States Commissioner of Patents, David L. Ladd, made the presentation at a special ceremony in the Department of Commerce.

Commissioner Ladd hailed the event as another achievement in the long history of the patent system that has helped spur United States technological growth. The patent system gives "every person an equal opportunity to create something new and improving what already exists," the Commissioner stated.

The first U.S. patent ever granted dates back to 1790 for an improvement in the "making of Pot ash and Pearl ash by a new Apparatus and Process." However, the actual numbering of the patents did not begin until 1836 when a new law was passed revamping the "American" patent system.

Tucked away in the files of the Patent Office are many famous inventions that revolutionized the country's way of life and had a profound effect on the rest of the world. Eli Whitney's cotton gin (1794), McCormick's reaper (1834) and Morse's telegraph (1840) helped steer the United States in its earlier days toward the technological age.

The "Golden Age of Inventors," the late 1800's, soon followed. This was the time of Bell's telephone, Edison's light bulb and phonograph, and Marconi's wireless telegraph.

Today, more than 300 applications pour into the Patent Office each day, showing that Americans have not lost the inventive touch.

• Science News Letter, 80:207 September 23, 1961



MAKING PATENT HISTORY—The 3,000,000th patent is inspected by its inventor, Dr. Kenneth R. Eldredge (left), and Dr. Robert R. Johnson of General Electric's computer department, Phoenix, Ariz.

BOTANY

Desert's Pioneer Shrubs Flourish in Ghost Town

► A STUDY of plant life on the streets of a Nevada ghost town has shown that the same "pioneer plants" common to naturally disturbed desert sites, such as dry washes, will also appear and thrive on sites disturbed by man.

This finding by Dr. Philip V. Wells of the biology department at New Mexico Highlands University, Las Vegas, N. M., differs from previous theories that there is no definite order of succession in desert vegetation, and that the first plants to reappear when such vegetation is destroyed will be the same plants that were formerly dominant.

Dr. Wells studied vegetation on 13 streets in Wahmonie, Nev., a townsite on a long outwash slope at the base of a mountain range. Wahmonie was completely deserted after a short-lived silver boom spawned it in 1928.

The plants in the denuded streets, he states, showed "pronounced changes" in comparison to vegetation on a less disturbed area adjoining the town. Desert shrubs were partially replaced by an open stand of bunch-grass, Dr. Wells reports in *Science*, 134:670, 1961.

His conclusion is that plants found in dry washes have a "pioneer or weedy character," marked by efficient seed dispersal, rapid growth and early maturity, that helps them become established in arid upland desert regions when the competition of the usually dominant upland shrubs is removed.

• *Science News Letter*, 80:208 September 23, 1961

CHEMISTRY

Bombs Test Radioactivity Useful for Dating Wood

► THE INCREASED amount of radioactivity thrown into the atmosphere by atomic bombs since 1945 has been found useful in providing a short-term dating method.

Prof. A. T. Wilson of the chemistry department of Victoria University of Wellington, New Zealand, has been using the increased amount of atmospheric radioactive carbon isotope 14 to determine the mechanism of heartwood formation in pine trees. He found that most of the heartwood is converted from sapwood, formed before the year of formation of the heartwood, since the increased radioactive carbon content was not present.

Prof. Wilson suggested the possibility of artificially inducing the formation of heartwood, which is economically more valuable than sapwood.

He urges biologists to take advantage of the increased carbon-14 in the atmosphere to determine other information that is time-linked, since this unique situation will not last more than a few years. The renewed atmospheric testing by the Russians will not greatly disturb this possibility if it is not long continued.

The carbon-14 in the air from nuclear tests is additional to that formed in the

upper atmosphere continuously by the bombardment of nitrogen by cosmic rays from outer space and conversion of nitrogen into the carbon isotope that decays at a known rate and therefore can be used to date once-living matter into which the carbon-14 finds its way through being swept to earth by rains. The research report appears in *Nature*, 191:714, 1961.

• *Science News Letter*, 80:208 September 23, 1961

MEDICINE

Can Overcome Baldness By Surgical Transplant

► BALD MEN with hairy chests can get a new hair covering grafted onto their heads.

Dr. Albert M. Kligman of the University of Pennsylvania Hospital, Philadelphia, says surgical treatment of baldness by replacement with chest hair is hardly warranted but that it will result in a permanent graft. The surrounding baldness will have no effect on the graft from the chest, and new hair will continue to grow from the transplanted area.

The scars, pain and expense of the transplant will probably keep most bald men from availing themselves of the operation.

Dr. Kligman, a Philadelphia dermatologist and syphilologist, was called upon to answer the question in the *Journal of the American Medical Association*, 177:737, 1961, about a bald patient.

Another question puzzling physicians is whether a railroad gang laborer, recovered from a heart attack, should return to a job that involves lifting 100 pounds or more. Although many patients "can get away with" such heavy work, the questioner is told to discourage it, by Dr. Arthur M. Master, associate editor of the *New York State Journal of Medicine and Diseases of the Chest* (p. 736).

• *Science News Letter*, 80:208 September 23, 1961

MEDICINE

First Photographs Of Hepatitis Virus**See Front Cover**

► A LENGTHY REPORT with the first photograph of hepatitis viruses and an accompanying editorial appear in the *Journal of the American Medical Association*, 177: 671, 1961. The report is from the research laboratories of Parke, Davis and Company of Detroit and from Drs. Joseph D. Boggs of the Northwestern University Medical School, Richard B. Capps, University of Illinois Medical School, Chicago, and Charles F. Weiss, Ann Arbor, Mich.

The viruses, photographed with an electron microscope, are 12 to 18 millimicrons in diameter (a millimicron is equal to one 25-millionth of an inch) and are shown on the cover of this week's *SCIENCE NEWS LETTER*.

Much remains to be done before a vaccine can be perfected for hepatitis, but the AMA says editorially that the report "represents the first substantial evidence that the hepatitis virus has been successfully cultivated."

• *Science News Letter*, 80:208 September 23, 1961

IN SCIENCE

PSYCHOLOGY

Four Percent Alcohol Preferred by Rats

► IN STUDYING the reactions of laboratory animals to alcohol the commonly used alcoholic concentration of ten percent is unreliable, two New York State psychologists report in *Science*, 134:470, 1961.

In self-selection experimental procedures, normal rats showed no clear-cut preference for alcohol until the concentration dropped to four percent.

Factors to be considered, Drs. Robert D. Myers of Colgate University, Hamilton, N. Y., and Robert Carey of Syracuse University, Syracuse, N. Y., said, include prior exposure of animals to the liquids, the specific genetic strain, the nutritional and metabolic states of the animal organisms, cage position of the liquid and possible stress conditions.

Neglect of any or all of these factors could seriously affect the validity of the research.

• *Science News Letter*, 80:208 September 23, 1961

MEDICINE

Blindness Attack Linked To St. Vitus' Dance

► A RARE CASE of sudden blindness was reported in a 20-year-old patient who developed St. Vitus' dance within a few weeks following the attack.

This has revived the disputed problem of what causes St. Vitus' dance, still unsolved.

Two British physicians, Drs. G. W. Hearn and M. J. Roper-Hall of the Birmingham and Midland Eye Hospital, report in the *British Medical Journal*, Sept. 9, 1961, that a fibrin embolus (blood clot) could have been the cause both of the blindness and later attack of chorea.

First described in 1685 by the English physician Sydenham, St. Vitus' dance, or chorea, has rarely been accompanied by retinal artery stoppage. Only one other report of such a case has occurred since 1925, and it, too, revived the formerly held but discarded "embolic" theory of the cause.

Drs. Hearn and Roper-Hall conclude that cases of chorea vary as to cause and procedure. In cases where eyes are affected by embolism, they believe that the old theory should not be ruled out.

Another British Medical Journal report by a flight lieutenant, Dr. G. S. Willets, advanced the theory that chorea after disturbance of vision was possibly associated with local arterial disease rather than with blood clots. Recovery of the vision between attacks of obstruction of the central retinal artery was achieved by the patient, a 21-year-old married woman who was advanced in pregnancy.

• *Science News Letter*, 80:208 September 23, 1961

IN THE FIELDS

SURGERY

Uncommon Lung Disease Healed by Operation

► THE ONLY KNOWN surgical operation for sporotrichosis, an uncommon fungus-type lung disease, has been reported at the Veterans Administration Hospital, Oteen, N. C.

Drs. Stewart M. Scott, E. D. Peasley and Thomas P. Crymes describe in *The New England Journal of Medicine*, 265:453, 1961, the case of a 42-year-old Negro florist whose X-ray showed a cavity in the left upper lung. Tests showed *Sporotrichum schenckii*, the type of fungus that causes sporotrichosis.

After giving the patient the usual treatment of potassium iodide for two months with no significant change on X-ray examination, the left upper lobe was removed. Although the operation was successful, the surgeons continued treatment with potassium iodide for six months.

Since 1912, 20 cases of pulmonary sporotrichosis have been reported, but only six have been "adequately documented," the surgeons report.

The dramatic results of treatment with potassium iodide have prevented thorough bacteriologic confirmation by animal inoculation, they point out.

• Science News Letter, 80:209 September 23, 1961

GENERAL SCIENCE

Scientists' Income Up: Median Salary Is \$9,000

► MOST UNITED STATES scientists were better paid during 1959 and 1960 than they were during the years from 1956 through 1958, the National Science Foundation reports.

Questionnaires returned by 112,432 full-time employed scientists to the Foundation's National Register of Scientific and Technical Personnel showed a 1960 median annual salary rate of \$9,000. This is a \$1,100 increase over the \$7,900 median reported for the 1956-58 period.

The same group reported a median gross income of \$10,000 for 1959. The additional income (above salaries) comes from such sources as supplementary employment, royalties and consulting fees.

The highest median gross income for 1959, \$14,000, was reported for those in medical sciences. Physics and chemical engineering, each with \$11,000, were second. Agricultural scientists ranked lowest with \$7,000 as both 1959 median income and 1960 median salary.

Rated by work activities, the 27% engaged in management and administration made up the best paid group, with a median income of \$12,000 in all fields. For managers and administrators in research and development, the median income rose

to \$13,000. Teachers, with a median 1960 salary of \$8,000, were among the lowest paid work groups, although full professors attained a median of \$19,000 in medical sciences and \$13,000 in engineering.

The median age was 38. The largest age group, 43%, was 30 to 39, with 40 to 49 next at 27% of the total. Thirteen percent were in their fifties and another 13% were under 30. The general pattern in earnings was a steady increase from \$6,000 at the youngest age group to \$12,000 at the oldest, the Foundation said.

Fifteen years of experience are necessary before income exceeds basic salary in most fields.

The scientists included 47% who were employed in private industry or self-employed, 27% by educational institutions, 13% by the Federal Government, six percent by other government activities, five percent by non-profit organizations, and about two percent on active duty with the Armed Forces or the U.S. Public Health Service.

• Science News Letter, 80:209 September 23, 1961

NOMENCLATURE

Numbers Seen Replacing Latin Names of Plants

► AS ELECTRONIC computers take over the tough job of sorting out members of the animal and plant kingdoms, Latin names will be replaced by numbers, a zoologist predicts.

Machines should help take some of the many kinks out of the present system of classifying living things, which is known as taxonomy, Dr. Theodore L. Jahn of the University of California at Los Angeles believes. This would necessitate devising a numbers code that would denote the features of an organism useful in classifying it as to kingdom, phylum, class, order, family and species.

The ultimate in such a system would be to use the same code that the genetic mechanism employs to insure that an organism passes on the same set of characteristics to succeeding generations. This code is contained in the DNA (deoxyribonucleic acid) of each chromosome.

This poses quite a problem, Dr. Jahn admits. It has been estimated, he points out, that the code of the 46 chromosomes of man, if set in type, would fill a thousand books. It may be a long time before man can design a code as compact as DNA.

Cracking the DNA code, regardless of whether it can be incorporated practically into a computer system, would be a boon to taxonomy, Dr. Jahn notes. For example, it might tell us whether a virus is some fragment of a chromosome or the leftover of a primordial organic soup that preceded the existence of cellular organisms.

In order to convert the present system for use with a computer it will be necessary to improve it through increased knowledge of the organisms. Progress might be greatly enhanced if there were an International Taxonomic Year, similar to the International Geophysical Year, devoted to a study of classification of organisms.

• Science News Letter, 80:209 September 23, 1961

BIOCHEMISTRY

Some Mental Diseases Linked With Chemical

► SOME MENTAL diseases are probably caused by a chemical derived from a nerve hormone in the brain.

Experiments conducted on rats have shown that the chemical, 10-methoxyharmalan, if produced in the body, can cause abnormal behavior. The chemical is derived from serotonin, a nerve hormone found in the brain and intestines.

Small doses of 10-methoxyharmalan fed to well-trained rats caused the animals to make mistakes each time they were used in an experimental "shuttlebox." Larger doses produced tremors that lasted nearly one hour.

The chemical is formed by removing a molecule of water from melatonin, a substance isolated from brain tissue. Melatonin, in turn, definitely forms from serotonin, Drs. William M. McIsaac, Philip A. Khairallah, and Irvine H. Page of Cleveland Clinic Foundation, Cleveland, report in *Science*, 134:674, 1961.

Definite evidence of the production of 10-methoxyharmalan in the body is still lacking, the scientists note. However, the present experiments plus the fact that "the highest concentration of serotonin has been found in brain tissue of mental patients," tends to support the hypothesis that "some psychotic states could be due to the chemical, 10-methoxyharmalan," the scientists conclude.

• Science News Letter, 80:209 September 23, 1961

PUBLIC HEALTH

Cesium-137 in Diet Determined by Urine Test

► CESIUM-137, a radioactive fission product present in fallout, can be measured in urine samples by a new radiochemical method that forms a simple and reliable basis for determining the amount of the isotope present in a person's current diet.

A. Morgan and Gloria M. Arkell of the Atomic Energy Research Establishment, Harwell, England, analyzed samples obtained from subjects with no known exposure to cesium-137 other than dietary fallout levels, gauging both cesium and potassium content. Cesium closely resembles potassium and travels with it through animal tissue.

They point out in *Nature*, 191:1100, 1961, that the ratio of cesium-137 to potassium in urine is equal to that in the diet and, under normal or near-normal conditions, is about one-third of that in the entire body. If the cesium-137 intake increases, urine analysis therefore will show it.

The researchers also note that the technique could be used to determine strontium-90 consumption as well as cesium-137 consumption. The ratio of strontium-90 to calcium in the diet is known to be about twice that found in urine samples. Strontium-90, which gets into bone and milk, is more widespread than cesium-137 and has been studied more extensively.

• Science News Letter, 80:209 September 23, 1961

ASTRONOMY

Bright Jupiter Seen in October

Jupiter and Saturn are still visible in October skies during the evening. The moon can be observed during the second half of the month, James Stokley reports.

► WITH THE COMING of the month of October, the planets Jupiter and Saturn are still visible in the evening sky. Jupiter is brighter than any star or other planet that can now be seen.

Both planets are shown on the accompanying maps, which depict the heavens as they look about ten p.m. your own kind of standard time (add one hour for daylight saving time) on Oct. 1, nine p.m. on the 15th and eight p.m. on the 31st.

Saturn is a little to the right of Jupiter, nearer the horizon, and about a twelfth as bright. However, it still ranks with the stars of the first magnitude. These two planets remain on view until about midnight.

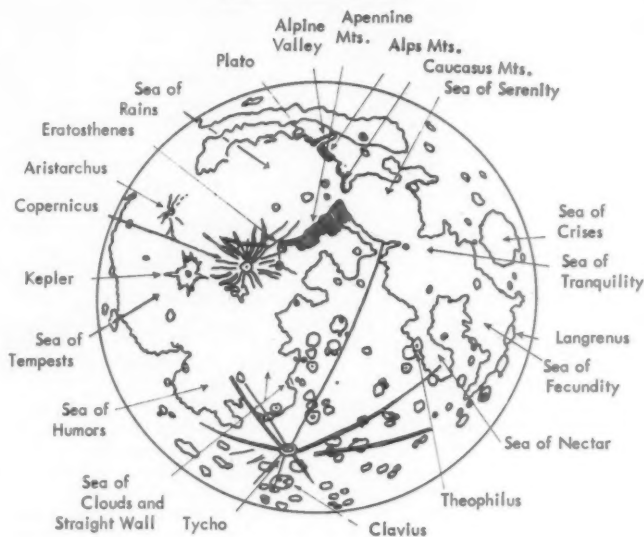
As for the stars themselves, the brightest now on view is Vega, in the constellation of Lyra, the lyre, high in the west (shown on the map of the northern half of the sky). Still higher is Cygnus, the swan, with a bright, first magnitude star named Deneb. Cygnus is divided on our maps, with part on the northern one and part on the southern. And between the lower part of Cygnus and the two planets lies Aquila, the eagle. This contains another star of the first magnitude, called Altair.

On the southern map, just to the east of

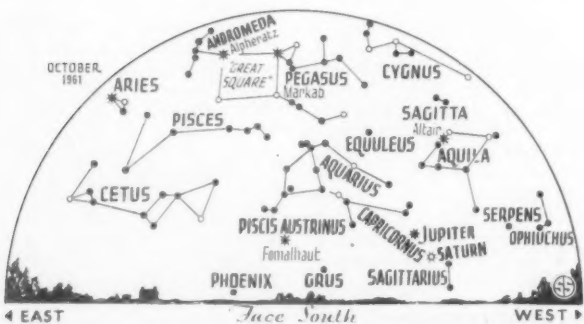
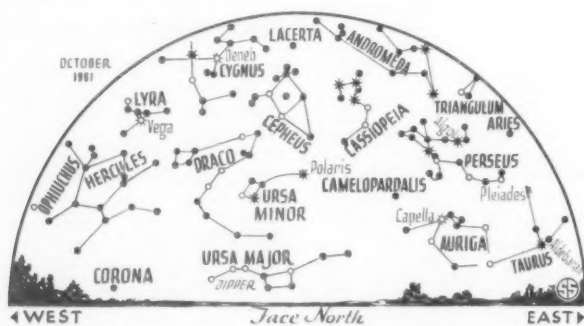
Cygnus you can find Pegasus, the winged horse of the old myth. This is a rather conspicuous group, even though the brightest stars in it are of the second magnitude.

The map shows the location of the "Great Square" in Pegasus, an easily located figure

MAP OF THE MOON



NORTH APPEARS AT THE TOP



• • • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

that helps you to find other groups around it. Actually, only three of the stars that make up the square are in Pegasus. The one in the upper left, named Alpheratz, is in Andromeda. This, in mythology, represented the princess that was left chained to the rock, to be devoured by a sea monster. Since she was rescued by the hero Perseus, who was riding on Pegasus, her proximity to the winged horse is appropriate.

Perseus, too, is in the sky, for this constellation is in the northeast. Here is the interesting star Algol. A famous variable, Algol fades from its normal brightness of magnitude two to the third magnitude every 2 days, 20 hours, 48 minutes. It is really two stars, one much fainter than the other and revolving around it. The dimming occurs as the faint one partially eclipses its more brilliant companion.

To the west of Perseus stands Cassiopeia, the queen, and Cepheus, the king, who were Andromeda's parents. All the principal characters in the mythological story are depicted in the sky—even the sea monster. He is represented by the constellation of Cetus, low in the southeast.

Three other first-magnitude stars are now visible. In the northeast, below Perseus, is Auriga, the charioteer, with the star Capella. And farther right is Aldebaran, in Taurus, the bull. This star is considerably dimmed because of its low altitude. However, it rises considerably higher in the South, and becomes brighter, later in the

night. And low in the south is Fomalhaut, in Piscis Austrinus, the southern fish. This star is now about as high as it ever gets, for latitude 40 degrees.

In addition to Jupiter and Saturn there are three other planets sometimes visible to the naked eye. Two of these, Mercury and Mars, are now too nearly in the same direction as the sun to be seen. But the third, Venus, rises in the east about two hours before the sun. Its brightness is about 3.6 times that of Jupiter, so it is very easy to find. In fact, it remains visible well into the dawn, long after other stars have faded.

The moon during October will be most prominent in the evening from about the 12th to the 26th. On Oct. 9, when it is new, it is in the same direction as the sun, and we cannot see it. But a few days later it will have moved far enough to the east that it remains visible in the sky after the sun has set. Moreover, little of the lunar hemisphere on which the sunlight is shining will be turned toward us, and so it will appear as a crescent in the west in the early evening.

On the 16th it will be at first quarter, with half of the illuminated hemisphere visible. Then it is in the south at sunset, and it sets about midnight. On Oct. 23 it will be full. Then it is opposite the sun, so it rises at sunset and sets at sunrise. The entire bright half is visible. After that it continues to rise later and later, so it is soon gone from the evening sky. It reaches last quarter on the last day of October, when it does not rise until midnight.

If you have a good pair of binoculars, or even of opera glasses, try using them to watch the moon, night after night, as it goes through its phases.

The moon is not smooth, but has many mountain ranges and craters scattered around its surface, some of which can be seen with such simple optical aid. And then there are the dark areas, visible to the naked eye, which form the familiar face of the "man in the moon." These are called "seas," even though there is no water on our natural satellite. The early lunar observers thought they were bodies of water and so named them. Some of their designations, still used, are quite fanciful—Sea of Tranquility, Sea of Serenity, etc.

The craters, which probably were formed by the impact of huge meteorites that exploded as they hit, are named after famous astronomers and other scientists. One of the largest, about 140 miles in diameter, is called Clavius, after the astronomer who assisted Pope Gregory XIII when he introduced our present calendar in 1582.

The principal seas, as well as some of the most prominent craters, are indicated on the accompanying lunar map, but all of these features cannot be seen at any one time. When the moon is full the craters are nearly invisible, but the seas are conspicuous. Around first quarter is the best time to see the craters. Then, for those near the middle of the lunar disc, the sun is shining at a low angle, and there are many shadows which bring them into relief.

So try your binoculars on the moon. Probably you will be surprised at what you can see.

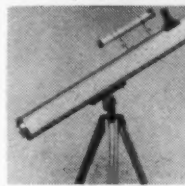
(continued on p. 215)

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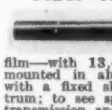
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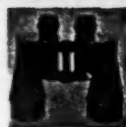
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• Books of the Week •

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A TO Z IN AUDIO—G. A. Briggs with R. E. Cooke—*Gernsback Lib.*, 224 p., illus., paper, \$3.20. Hi-fi glossary.

ABSORPTION SPECTRA IN ULTRAVIOLET AND VISIBLE REGION (A Theoretical and Technical Introduction)—L. Lang, Ed.—*Academic Press*, 494 p., illus., ring-binding, \$18. Results and data of recent experimental work done at chemical and physical research institutes in Hungary.

ADVENTURES IN GRAPHING—William H. Glenn and Donovan A. Johnson—*Webster Pub. Co.*, 64 p., illus., paper, 85¢. Examples and exercises for exploring the mathematics of graphs on your own.

ADVENTURES IN NATURE: Selections from the Outdoor Writings—Edwin Way Teale—*Dodd*, 304 p., illus., by Walter W. Ferguson, paper, \$1.95. Naturalist's observations from Maine to California.

ADVENTURES OF THE MIND from The Saturday Evening Post (Second Series)—Richard Threlson and John Kobler, Eds.—*Knopf*, 654 p., photographs, \$6.50. Forty essays by creative thinkers, interpreting advances in specialized fields, for the layman.

THE AMERICAN HIGH SCHOOL AND THE TALENTED STUDENT—Frank O. Copley, foreword by Richard Pearson—*Univ. of Mich. Press*, 92 p., \$3.95. Addressed to parents and educators, deals with the problem of how large or small American high schools can better educate the superior students.

ANSWERS AND MORE ANSWERS—Mary Elting—*Grosset*, 156 p., illus., by Tran Mawicke, \$3.95.

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AUTOMATION IN THE OFFICE—Ida Russakoff Hoos—*Public Affairs Press*, 138 p., \$4.50. Outgrowth of three years of field research, this study gives particular attention to the complex social impact of automation.

BRITAIN'S SEARCH FOR HEALTH: The First Decade of the National Health Service—Paul F. Gemmill—*Univ. of Pa. Press*, 171 p., \$5. Outcome of a four-year objective study of the British system for providing some 50 million people collectively with whatever health care they need individually.

THE CHEMICAL AND BIOLOGICAL ACTION OF RADIATIONS, Vol. V.—M. Haissinsky, Ed.—*Academic Press*, 278 p., graphs, \$8. On mechanism of the radiolysis of water by gamma rays, action of alpha rays, diffusion kinetics in radiation chemistry and mass spectrometry.

COMPUTING DEVICES—Donovan A. Johnson and William H. Glenn—*Webster Pub. Co.*, 55 p., illus., paper, 80¢. For students who want to explore the mathematics of computers on their own.

CONCEPTS OF MASS: In Classical and Modern Physics—Max Jammer—*Harvard Univ. Press*, 230 p., \$6. Comprehensive exposition of the historical development of the concept of mass, and of the meaning of the term and its role in physics.

CRIME SCIENTISTS—Mike McGrady—*Lippincott*, 149 p., photographs, \$3.25. The story of those concerned with the scientific investigation of crime in the police laboratories of large cities.

THE DETERMINATION OF STABILITY CONSTANTS AND OTHER EQUILIBRIUM CONSTANTS IN SOLUTION—Francis J. C. Rossotti and Hazel Rossotti—*McGraw*, 425 p., \$12.50. Text for graduate students and work of reference.

DISCOVERY: Great Moments in the Lives of Outstanding Naturalists—John K. Terres, Ed.—*Lippincott*, 338 p., illus. by Thomas W. Nason, \$6.50. Collection of narratives by 36 distinguished contemporary naturalists.

DWELLERS IN DARKNESS—S. H. Skaife—*Doubleday*, 180 p., illus., paper, 95¢. Detailed account of the strange ways of the black-mound termites of the Cape, South Africa.

ELECTROPHYSIOLOGICAL METHODS IN BIOLOGICAL RESEARCH—J. Bures, M. Petran and J. Zachar—*Czechoslovak Acad. of Sciences (Academic Press)*, 515 p., illus., \$15. Theory and techniques of electrophysiology, the analytical research tool that gives a picture of processes in living matter from individual cells to the mammalian brain.

KANSAS WILD FLOWERS—William Chase Stevens—*Univ. of Kansas Press*, 2nd ed., 461 p., 761 photographs by author, \$8. Handbook presents about 500 species of wild flowers common to the Middle West, with detailed descriptions and clear illustrations.

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LABORATORY MANUAL FOR DAIRY MICROBIOLOGY—E. M. Foster and W. C. Frazier—*Burgess*, 3rd ed., 72 p., paper, \$3. Concise directions for experiments with milk microorganisms, milk quality testing and microbiology of dairy products.

THE LORE OF LARGE NUMBERS—Philip J. Davis—*Random House*, 165 p., illus., paper, \$1.95. Written by professional mathematician to make the arithmetic of large numbers interesting and understandable to high school students and laymen.

MAN AND POWER: The Story of Power from the Pyramids to the Atomic Age—L. Sprague de Camp—*Golden Press*, 189 p., illus., \$4.95. Colorful panorama depicting and describing man's development of sources of energy to help him build, move around and produce.

MATHEMATICS IN THE MAKING—Lancelot Hogben—*Doubleday*, 320 p., 400 illus., \$9.95. Colorful, graphically presented review of man's use of mathematics through the ages, written by mathematician for the general reader.

MEDICAL AND BIOLOGICAL ASPECTS OF THE ENERGIES OF SPACE—Paul A. Campbell, Ed.—*Columbia Univ. Press*, 491 p., illus., \$10. Brings together special knowledge in the medical, biological, astrophysical and engineering sciences as related to the energies of space, their conversion and use.

MODERN SCIENCE AND THE NATURE OF LIFE—William S. Beck—*Doubleday*, 334 p., paper, \$1.45. Reprint of 1957 book on the historical development of the scientific attitude.

THE NEW LEADERS OF AFRICA—Rolf Italiaender, transl. from German by James McGovern—*Prentice-Hall*, 306 p., photographs, maps, \$5. Portrays the lives and actions of the new native African statesmen and politicians.

THE OCEAN ISLAND (Inagua)—Gilbert C. Klingel—*Doubleday*, 415 p., map, photographs by author, paper, \$1.45. Reprint of naturalist's observations of life on land, in sea and air, on an island in the Bahamas.

ON THE VARIOUS FORCES OF NATURE—Michael Faraday, introd. by Sir J. Arthur Thomson, foreword by E. N. da C. Andrade—*Crowell*, 155 p., illus., with original diagrams, \$2.75. New edition of the first of the famous Christmas Lectures at the Royal Institution in London to appear in book form.

RED TAG COMES BACK—Fred Phleger—*Harper*, 64 p., illus., by Arnold Lobel, \$1.95. Charming book for beginning readers, follows a tagged salmon through its life cycle.

SCIENCE AND THE NEW NATIONS: The Proceedings of the International Conference on Science in the Advancement of New States at Rehovoth, Israel—Ruth Gruber, Ed.—*Basic Books*, 314 p., illus., \$6.50. Summaries of papers and highlights of discussions of delegates from developed and underdeveloped countries on five continents.

SCIENCE SURVEY 2—A. W. Haslett and John St. John, Eds., foreword by Sir Wilfrid Le Gros Clark—*Macmillan*, 372 p., illus., \$7.50. Second annual selection of scientists' reports on recent advances of interest to the intelligent layman, planned in cooperation with the British Association for the Advancement of Science.

SHEARWATERS—R. M. Lockley—*Doubleday*, 256 p., illus., paper, \$1.25. A record of the breeding and migration habits of the seabirds.

SOUTH AFRICA—Monica M. Cole—*Dutton*, 696 p., photographs, maps, diagrams, \$16.95. Comprehensive work on South African geography, water supply, agriculture, mineral resources, power resources, industries, communications and major regions.

SOVIET POWER: Energy Resources, Production and Potentials—Jordan A. Hodgkins—*Prentice Hall*, 190 p., maps, \$5.25. Analysis of distribution, reserves and energy potential of Russian

coal, oil shale, oil and natural gas, in a region by region survey with projections to 1965.

TEACHING BY MACHINE—Lawrence M. Stolurrow—*Office of Educ. (GPO)*, 173 p., illus., paper, 65¢. Monograph examines the potentialities of auto-instructional materials as aids to more economical and efficient solutions to educational problems.

TEACHING HIGH SCHOOL SCIENCE: A Sourcebook for the Physical Sciences—Alexander Joseph and others—*Harcourt*, 674 p., \$7.95. Offers a wide variety of demonstration and laboratory procedures, and suggestions for projects and experiments, suitable for many science courses.

TRANSACTIONS OF THE SECOND PRAGUE CONFERENCE ON INFORMATION THEORY, STATISTICAL DECISION FUNCTIONS, RANDOM PROCESSES—V. E. Benes and others; J. Kozesnik, Ed.—*Czechoslovak Acad. of Sciences (Academic Press)*, 843 p., illus., \$22. Contains papers given by European, U.S. and U.S.S.R. experts.

INVENTIONS

Patents of the Week

A photographic system that records the bomb damage after a nuclear attack, a spraying device for painting flagpoles and a folding fire ladder have been patented.

► **AN AUTOMATIC** photographic system that photographs the amount of bomb damage after a nuclear attack has been patented.

The high-flying camera unit snaps a series of pictures during the brief time between the explosion's bright flash and the formation of the deadly mushroom cloud, inventor George W. Goddard, Chevy Chase, Md., stated in patent No. 2,998,762. Rights were assigned to Bulova Research and Development Laboratories, Inc., Woodside, N. Y.

When a bomb is released from the airplane, a timing mechanism opens the lens shutter while simultaneously closing the lens port with a dense filter and capping plate to prevent pre-exposure while the camera is in the "ready" position. The plate is automatically raised just before the explosion.

The atomic explosion's bright flash is recorded by a photo-cell, which raises the filter and a series of pictures are snapped.

The camera is mounted in the airplane's nose and has a wide-angle lens necessary for the large destructive radius of atomic bombs. The increased damaged area and the nature of the after effects have made conventional strike and bomb damage assessment techniques useless in the nuclear environment, the inventor stated.

The days of the flagpole sitting painter are numbered, according to patent No. 2,998,801. Arthur F. Edelberg, Cleveland, Ohio, has invented a spray painting device that is raised or lowered on the halyard of the flagpole. Patent rights were assigned to Kamco Products, Inc., also of Cleveland.

The box-like device which wraps around the pole is hoisted to the top. Spray guns are then turned on while the painting unit is lowered by gravity and controlled by the halyard. Bristle brushes located at both ends of the casing smooth the sprayed

LA VICTORIA: An Early Site of the Pacific Coast of Guatemala—Michael D. Coe—*Peabody Mus.*, Vol. 53, 162 p., illus., \$11; paper, \$6.50. Analysis of cultural materials excavated in an early village site, including many figurine heads of the Conchas phase.

VOICES IN STONE: The Decipherment of Ancient Scripts and Writings—Ernst Doblhofer, transl. from German by Mervin Savill—*Viking*, 327 p., illus., \$6. Austrian philologist's work explains for the layman, with the help of many illustrations, the procedures followed by specialists in the decipherment of scripts of the past.

WHEELS, SAILS AND WINGS: The Story of Transportation—Fred Dietrich and Seymour Reit—*Golden Press*, 100 p., illus. by Harald Bukor and others, \$3.95. Large-scale picture book shows boys and girls how man attempts to conquer time and space.

• *Science News Letter*, 80:212 September 23, 1961

OPTICAL STAR-FINDER

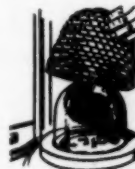


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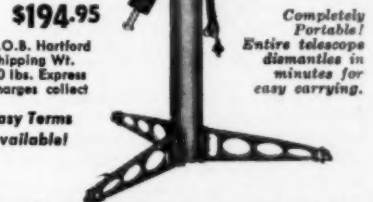
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A large increase in the missile's thrust is also provided by using wing tip rollers or ball bearings that fit into grooves in the launching tube. The bearing assembly is cast off as soon as the missile is airborne.

• *Science News Letter*, 80:213 September 23, 1961

• New Ideas and Gadgets •

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D.C., and ask for Gadget Bulletin 1110. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

✿ **RADIATOR-CAP COVER** with a diameter about one and a half times that of a metal radiator cap protects hands from being burned when removing the cap from a steaming radiator. The cap cover of polyethylene resin, usable on most American cars, withstands heat and rough handling. It is available in five colors and can be personalized.

• Science News Letter, 80:214 September 23, 1961

✿ **PLANT WRAPPING** for nurserymen effectively protects delicate roots and plants during shipment or transfer, eliminating the need for wet moss or wood shavings. The new wrap consisting of creped paper coated with tough plastic permits the plants to "breathe," retains moisture, and prevents light penetration and mold growth.

• Science News Letter, 80:214 September 23, 1961

✿ **AUTO BUTLER**, a handy litter container of heavy duty washable plastic, swivels under the dashboard when not in use. Simple to remove for disposal of contents, the plaid container fastens to the underside of the dashboard with a metal clasp. Useful also in boats and the home.

• Science News Letter, 80:214 September 23, 1961

✿ **PICK-PROOF LOCK**, shown in the photograph, features a new design for the key, keyway and internal locking mechanism, in which conventional keys cannot fit.



The padlock has a case-hardened steel shackle double-locked at both heel and toe by a heavy solid brass double-rotating bolt. All locks are registered in the purchaser's name and guaranteed.

• Science News Letter, 80:214 September 23, 1961

✿ **SMALL SOLDERING IRON** with convenient 120-volt operation is suitable for the

"do-it-yourself" jan as well as industry. Designed for maximum heat at the tip and fast temperature recovery, the iron has a comfortable, cool, plastic handle. The set includes handle, cord and tip assembly.

• Science News Letter, 80:214 September 23, 1961

✿ **SAFETY CANDLE** is battery operated on the principle of the flashlight and is safe for use in church, schools, music groups or other performances, indoors or outdoors. The 8- or 12-inch tall candles light up realistically by merely screwing on the prism-cut translucent plastic flame. Bases are available separately.

• Science News Letter, 80:214 September 23, 1961

✿ **AUTOMATIC BUTTON STITCHER** for clothing manufacturers automatically stitches buttons on men's coats and vests at the rate of 1,000 buttons per eight-hour day. Duplicating hand-stitching, it eliminates one of the most tedious operations in the clothing industry.

• Science News Letter, 80:214 September 23, 1961

✿ **FREE-WHEELING TRICYCLE** with a handlebar control lever enables the child to shift into free wheeling or lock the rear wheels into straight line riding. The rear wheels which can turn in a complete 360-degree circle allow the sharp turns impossible with the conventional tricycle.

• Science News Letter, 80:214 September 23, 1961



Nature Ramblings



Do You Know?

► ON WARM autumn days, thousands of butterflies may be seen flying southward, usually several hundred feet above the ground.

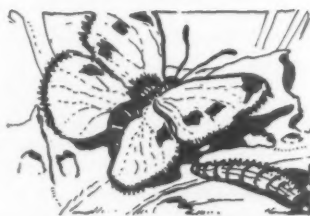
In the spring, ships in the English Channel may see great clouds of the small white butterfly, the large white butterfly, the red admiral or the painted lady flying toward the British Isles.

But in the fall, butterfly migration is as spectacular in the United States as anywhere else in the world, for here the large and colorful monarchs can be seen during their autumnal journey from Canada to Mexico.

For some reason the monarchs do not congregate during their spring migration; each butterfly makes the trip more or less by itself. For the fall flight, however, thousands of them gather to spend the night in trees and bushes, and then fly off the next day, sometimes working up speeds of 25 miles an hour.

The monarch is not the only butterfly migrant in this country. The buckeye migrates, as does the purple wing, the great southern white, the cloudless sulphur and

Butterfly Migration



the little sulphur.

Butterfly experts have written books on the subject of these migrations, and the experts themselves are the first to declare that very little is known about the phenomenon. No one knows exactly why the migrations occur or what triggers them.

It may be that the butterflies move out because overcrowding makes food scarce in a particular area. Parasites may play an important role. But for the moment, the periodic flight of the butterfly is mostly mystery.

• Science News Letter, 80:214 September 23, 1961

Acid drainage resulting from coal mining operations is a major water pollution problem in the United States.

Two hundred million humans have simple goiter.

The most urgent farm adjustment problem in the United States continues to be that concerning wheat production.

Elephantiasis, long a serious disease problem in the tropical Pacific, may cease to exist in islands where an effective new program that combines treatment with a drug and mosquito control has been instituted.

Since 1941, the number of cows in the United States decreased 30%, while average milk production per cow increased 48%.

Among adults more than 40 years old glaucoma was present in 20 cases out of 1,000 tested.

• Science News Letter, 80:214 September 23, 1961

Bright Jupiter Seen

(continued from p. 211)

Celestial Time Table for October

Oct.	EST	
1	9:10 a.m.	Moon in last quarter
3	12:08 a.m.	Algol (variable star in Perseus) at minimum
5	3:00 a.m.	Moon farthest, distance 251,900 miles
	8:56 p.m.	Algol at minimum
7	3:00 a.m.	Moon passes Venus
8	5:45 p.m.	Algol at minimum
9	1:53 p.m.	New moon
16	11:35 p.m.	Moon in first quarter
	midnight	Moon passes Saturn
17	9:00 a.m.	Moon passes Jupiter
21	2:00 a.m.	Moon nearest, distance 226,600 miles
22	2:00 p.m.	Mercury between earth and sun
23	4:31 p.m.	Full moon
25	10:37 p.m.	Algol at minimum
28	7:26 p.m.	Algol at minimum
31	3:59 a.m.	Moon in last quarter

Subtract one hour for CST, two hours for MST, and three hours for PST.

Know the Sky

These star maps showing the positions of stars and planets can help you locate satellites when they flash briefly across the sky. Familiarity with the constellations and their relative positions makes locating artificial moons much easier whenever they are visible from your area.

• Science News Letter, 80:210 September 23, 1961

ASTRONOMY

New Faint Comet Found In Constellation Pisces

▶ A FAINT COMET has been discovered in the constellation Pisces, or the fishes.

The comet, first seen on Sept. 1 by Dr. M. L. Humason of Mt. Wilson and Mt. Palomar Observatories, was reported to be of 16th magnitude and can only be viewed through large telescopes.

The comet was reported to Harvard College Observatory, Cambridge, Mass., clearing house for astronomical information in the Western Hemisphere.

• Science News Letter, 80:215 September 23, 1961

Questions

AERONAUTICS—What is the estimated cost of a 2,000-mile-per-hour Mach 3 plane? p. 205.

SPACE—How many men are future U. S. space ships expected to carry? p. 203.

Photographs: Cover, Parke, Davis & Company; p. 203, The Garrett Corporation; p. 205, Radio Corporation of America; p. 207, General Electric Co.; p. 214, Eagle Lock Corp.



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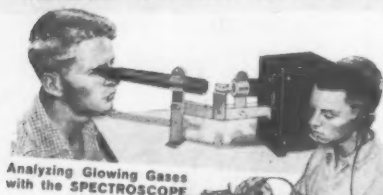


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